

# BRIGHTWORK

## Acknowledgments

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*This manual is the tangible product of a two year long, collaborative process involving members of the marine trade industry, environmental advocacy groups, and state and federal regulatory officials.*

*The goals of this process were to develop meaningful benchmarks for the control of non-point source pollution from Maine's marinas and boatyards, develop practical management practices that would enable facilities to meet those benchmarks and create a educational program that helps everyone understand the relevant regulations and how to meet them.*

*This process would not have been successful if not for the enthusiastic, thoughtful, engaging and tireless contributions of the following people.*

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Cover Photo Credit: Seal Cove Boatyard  
Cover Design: Rich Eastman

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

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# Best Management Practices Manual for Maine's Boatyards and Marinas

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## Manual Format

### *How this manual is organized.*

The purpose of this manual is to help those of you who operate marinas and boatyards reduce pollution from your facility by providing:

- A clear benchmark for environmental compliance.
- A number of common sense practices that enable you to meet the benchmark.
- A list of actual regulatory references that form the basis of the benchmark.
- A self-evaluation tool through the Maine Clean Boatyards and Marinas Program (MCBMP) that makes measuring your progress against the benchmarks easier, and
- A group of tools, templates, forms and reports to help you meet the letter and intent of the standards and laws.

The benchmarks (standards by which something can be judged) in this manual were developed through a collaborative effort involving industry representatives, environmental organizations and regulatory officials. The benchmarks represent existing laws or regulations made into statements that are relevant and clear to the boatyard or marina operator. They ARE NOT new regulations or laws. They are merely restatements of existing laws into terms that can be easily applied and measured by you or a regulatory official visiting your facility.

The BMP manual revision and expansion was prompted by a numbers of factors including the increased scrutiny given to boatyard and marina environmental practices and the impact they may have on the environment. This project was concurrent to a pilot Casco Bay Clean Boatyards & Marinas Project, being managed by the Maine Marine Trades Association. Due to the success of the pilot, the Maine Clean Boatyards & Marinas Program is underway statewide. The Clean Boatyards and Marinas Program Checklist was developed to complement and reflect this manual.



Photo of award ceremony for DiMillo's Marina, Great Island Boatyard, & Paul's Marina, certified Clean Boatyards and Marinas. Award presented by DEP Commissioner Dawn Gallagher, US Representative Tom Allen, and representatives of Maine Marine Trade Association and Friends of Casco Bay. Photo Credit MMTA

The manual is organized into five sections:

- 1. INTRODUCTION,**
- 2. JOBS AND PRACTICES,**
- 3. REGULATORY REFERENCES,**
- 4. MAINE CLEAN BOATYARDS AND MARINA PROGRAM, AND**
- 5. TEMPLATES AND TOOLS.**

The **INTRODUCTION** includes a letter from the commissioner of the DEP, the table of contents, the purpose and format of the document, and a brief overview of the potential pollution that can come from marinas and boatyards.

**THE JOBS AND PRACTICES** section contains the “real guts” of the manual and is organized by major job (process) area. Each job section contains a benchmark relevant to that process. Following the benchmarks are specific “Best Management Practices” (BMPs) that are ways to achieve the benchmark. Each BMP represents only one way to meet the benchmark, there may be multiple ways that are more creative and effective for your situation. The purpose of the BMPs is to give you at least one method to meet the benchmark, but not to limit you in thinking up better methods.

Each job section is identified by an icon in the upper right corner. In addition, throughout the entire section you will be alerted to health and safety, planning, reporting, permitting, record keeping or testing requirements, and recycling opportunities by special icons next to the relevant text. These “Heads-Up” icons are meant to be helpful but should not be considered definitive; make sure to refer to the appropriate regulation.

“Heads-Up” Icon key



Planning Required



Health and Safety Issues



Testing Required



Permitting, Reporting, or Record Keeping Required



Recycling Opportunity

Finally, at the end of each process section are a number of regulatory “thumbnails”; brief overviews of the major laws or regulations that shaped the benchmark and

determine the BMPs. More detailed information about each regulatory thumbnail is provided in the “Regulatory Reference” section.

**THE “REGULATORY REFERENCE”** section contains the actual text of relevant state statutes, rules or other applicable regulations, plus fact sheets, handbooks or other helpful regulatory guides. This section is organized by regulatory program because some regulatory programs show up in multiple process areas. If the text of the material is short or very commonly used, the text will be contained in this manual. If the text is very long, or as a back up to the information in the manual itself, it may be found in a companion CD-ROM where you can search by key word or browse by section.



Clean Boatyard and Marina Program flag  
Photo Credit: DiMillos Marina

**THE “MAINE CLEAN BOATYARDS AND MARINAS PROGRAM”** section contains all the information and tools for becoming a certified “clean” boatyard or marina. Included in this section are the program description, a self evaluation checklist, a resource guide, and pledge.

**THE “TEMPLATES AND TOOLS”** section contains sample documents, report or plan templates, and checklists to help you evaluate your compliance, and produce the documents you need to have on hand or submit to regulatory officials.

## Environmental Need

*Why is this all so important*

### Why be Concerned About Marinas and Boatyards?

Pollution from surface runoff and other diffuse sources, known as "nonpoint source pollution" (NPS), is caused by rainfall or snow melt carrying natural and man-made pollutants into lakes, rivers, streams, wetlands, estuaries, other coastal waters and ground water. Pollution from discrete sources such as oil spills, hazardous materials, or detergents from faulty septic systems or boat toilets can also be considered nonpoint source pollution. Many contaminants, such as bacteria and viruses, nutrients, suspended solids, petroleum products, and other toxins are introduced into the environment from this polluted runoff. Studies show that NPS accounts for 40-60% of the pollution entering our waters.



Contaminated runoff during rain storm  
Photo credit: MEDEP

## Pollution Management at Boatyards and Marinas

Most marinas and boatyards are located on or adjacent to coastal waters, lakes, and rivers, and their activities can contribute significant pollution directly to these waterbodies. For example, marina construction may alter the type of habitat on and adjacent to the site. Fueling, maintenance operations, scraping and painting, the improper discharge of boat toilet contents, and other common activities can discharge pollutants that affect water quality.

The most effective way to reduce polluted runoff is by pollution management practices and controls (called Best Management Practices or BMPs). This manual describes many simple practices that, when applied correctly, can minimize pollution from your site and enhance your environmental law compliance. Any questions about specific regulations, compliance responsibilities, or the implementation of BMPs should be directed to the nearest DEP office.



Boatyards are usually near the water and at the bottom of a hill.  
Photo credit: MEDEP

## Pollution Impacts from Boatyards and Marinas



Marine rail over intertidal zone  
Photo credit: Bunnell Marine Consulting

Pollution impacts from marinas and boatyards depend on the types of activities that occur at the site and the way those activities are performed. Hull and engine maintenance and repair, and fueling can produce wastes that can harm the environment if mismanaged. Persistent toxic pollutants can create significant long-term environmental problems and can dramatically affect the sale of your property in the future. Other less persistent pollutants can have immediate and severe impacts, but the damage to the environment can be eliminated once the pollutant is no longer discharged.

## Persistent Toxic Pollutants

The two groups of toxic pollutants that accumulate in the sediments near marinas and boatyards are organic chemicals and heavy metals. Some organic chemicals occur naturally, but several hundred thousand have been developed for use in oils, paints, pesticides, cleaners, solvents, and other products. The organic compounds most commonly associated with activities at marinas and boatyards are hydrocarbons, and solvents. Hydrocarbons include lubrication oil, gasoline, fuel oil and exhaust residues from burning fuel. Components of gasoline, diesel fuel and kerosene, and solvents can be less persistent and acutely toxic. Persistent organic chemicals eventually become



harmless, but this process takes years or decades; during the interim, they can remain toxic.

Heavy metals are persistent elements such as lead, mercury, copper, nickel, cadmium, zinc, chromium, and arsenic. These metals are in paint particles, metal shavings, engine oils, bilge water, and runoff from maintenance and repair areas. Metals, such as chromated copper arsenate (CCA), are in wood preservatives commonly used in dock and pier construction. Metals generally do not break down into less harmful chemicals and tend to accumulate where they are released into the environment.



Contaminated wash water  
Photo credit: MEDEP

A number of studies have documented elevated levels of toxic contaminants in Maine's marine sediments. These accumulation levels are primarily attributed to human activity, including the operation of boatyards and marinas. Tests of sediment near wharves and docks show that hydrocarbons and heavy metals are present at elevated concentrations.

## Toxicity

The toxicity of chemicals depends on how they are structured, how much is present, and how readily they can be absorbed and accumulated in the tissues of living organisms. Mercury, for example, is relatively nontoxic in some forms, but highly toxic in other forms. While essential for a healthy diet in low concentrations, copper, nickel, and zinc can be lethal to humans and other animals in high doses.

In water, some toxic contaminants, such as gasoline, float to the surface where the young of many animals live during their most sensitive life stages. Others adhere to sediments and settle to the bottom where they can impact the bottom dwelling plants and animals. The highest levels of toxic pollutants usually accumulate in areas where sediments are deposited. Hydrocarbons can cause cancer, mutations and birth defects.

## Impacts from Persistent Toxic Pollutants

Persistent toxic pollutants have the potential to have a negative long-term impact on the waterbody. Toxic chemicals can also combine to produce a synergistic or “cocktail effect” that is more harmful than exposure to a single substance. Organisms vary widely in their uptake and retention of toxic contaminants. Some species exhibit reproductive, birth and developmental problems, organ damage or harmful impacts on the nervous, immune and endocrine systems, while other species seem to have no response.

Toxic contaminants are of particular concern because of the potential for bioaccumulation, bioconcentration and biomagnification in organisms.



Contaminated wash water enters harbor  
Photo credit: MEDEP

Bioaccumulation is the uptake and retention of pollutants from the environment by organisms.

Bioconcentration is the uptake and retention of pollutants directly from the water through tissues such as the gills, gut, or organ walls.

Biomagnification is the process whereby pollutants are passed from one animal to another resulting in higher levels of pollutants in organisms further up the food chain (e.g., birds, whales, and humans).

Contaminants collect in sediments, so bottom-dwelling animals that live in mud habitats tend to accumulate pollutants. These bottom-dwelling (or benthic) animals play an important role as a source of food for larger animals such as fish, birds, and lobsters and crayfish.

In Maine, lobster liver (tomalley) and fish have elevated levels of mercury and dioxin resulting in consumption advisories. The source of contamination includes airborne deposition, point source pollution and non-point source pollution.

Elevated levels of toxic contaminants in fish and crustaceans can inhibit growth and reproduction, disrupt the life processes of the young, change sex ratios, cause cancer or problems with the endocrine system, or even result in death. Toxic contaminants can inhibit natural immunities, making animals more susceptible to disease and attack by microorganisms. Fin rot in fish and shell degradation in lobsters are examples of this type of disease.

Mammals and birds that feed on bottom-dwelling organisms or fish may absorb concentrated amounts of contaminants. Many of the tidal mudflats along Maine's coast are important feeding areas for shorebirds, waterfowl, and wading birds. If the animals that they feed on in these flats are contaminated, the bird population may become impacted.

## Economic Effects

Testing of sediment near wharves and docks prior to dredging has shown that hydrocarbons, lead, mercury, nickel, copper and other heavy metals frequently accumulate at elevated levels. If the sediments have to be dredged and do not pass the toxicity tests required by state and federal agencies, they cannot be disposed of at sea. Disposing of them on land costs about ten times more than ocean disposal. Further, many financing providers and potential buyers are requiring environmental evaluation of the property prior to purchase. Long term pollutant discharge can contaminate

large areas of boatyards and can require substantial and costly clean up, significantly impacting property sale price.

## Sources

Toxic pollutants wash into harbors and bays from marinas or boatyards when it rains, during snowmelt, or during boat cleaning activities. Pollutants also are introduced directly into the water from activities such as fueling and running boat engines.

Heavy metals in Maine's environment are the result of contemporary or historical discharges from vehicles and industry, leaching from rocks and minerals, deposition from polluted air, as well as from activities at marinas and boatyards.

Antifouling paints are designed to be toxic to marine organisms and are a source of heavy metals. Various maintenance and repair activities may also add these contaminants to the environment.

Hydrocarbons in Maine's waters come from motorized vehicles and their exhausts; smoke from industries and residences; stormwater discharges; old industrial sites and dumps; air pollutants from the eastern seaboard and the Midwest; and businesses that use and handle oil, including marinas and boatyards. During fueling or engine maintenance, hydrocarbons may be discharged into the water directly. On average  $\frac{1}{4}$  cup of fuel is spilled every time a boat is filled with fuel. Finally, runoff from parking areas, boat ramps, and other impervious areas may contribute hydrocarbons to the waterbody.



Boatyards and marinas can be is fragile locations  
Photo credit: MEDEP

## Other Pollutants Associated with Boatyards and Marinas



Hazardous materials storage at boatyard  
Photo credit: MEDEP

Less persistent pollutants may have immediate and potentially severe impacts on the environment, but the damage to the environment can be eliminated once the pollutant discharge has ceased. These pollutants include:

**Solvents:** Solvents are used in engine maintenance and repair, boat painting, and cleaning. Solvents, such as tetrachloroethylene, tetrachloroethane, trichloroethylene, trichloroethane, and methylene chloride, are used as degreasing agents and in varnishes, paint removers, and lacquers. Many solvents are known carcinogens.

**Antifreeze:** Permanent antifreeze that contains ethylene glycol is toxic to many organisms. Such antifreezes are used as engine coolants and to prevent freezing during winter storage.

**Acids/Alkalis:** The primary sources of acids and alkalis from marinas are batteries and compounds used for cleaning boats. Battery acid is extremely corrosive and often contains high concentrations of heavy metals (e.g., lead). Spilled battery acid may be transported to the waterbody via surface runoff or groundwater transport.

**Soil:** Soil may enter the waterbody during construction and by stormwater runoff. Operating boats in shallow waters can scour the bottom and re-suspend bottom sediment, as well as cut off or uproot plants. Sediments are also stirred up during dredging operations. Sediments may affect the waterbody by: 1) smothering bottom-dwelling plants and animals; 2) decreasing clarity, which may reduce the amount of available light that plants and phytoplankton need to grow, as well as affect the ability of animals to find food; 3) clogging fish gills; 4) increasing sediment oxygen demand, resulting in the depletion of dissolved oxygen and 5) attaching to contaminants, such as heavy metals and hydrocarbons.



**Nutrients:** Nutrients, particularly nitrogen and phosphorus, are essential to plant growth. However, in elevated concentrations, they stimulate nuisance plant growth either in the form of algal blooms, or excessive growth of weed-like plants. When this excessive plant growth dies and decays, dissolved oxygen concentrations may become depleted and kill fish and other animals. Algal blooms can reduce light penetration and harm beneficial plants like eelgrass. Also, excessive growth of tiny plants attached to the blades of larger plants can harm the growth of the larger plant. Weed-like plants tend to out-compete the normal plants and may smother animals. In marine waters, excess nitrogen tends to stimulate nuisance plant growth; in freshwater, phosphorus tends to be the nutrient that stimulates growth.

Marina and boatyard activities that may add excessive nutrients to the waterbody include sanitary wastewater disposal, dredging, fertilizing lawns, soil disturbance, and boat cleaning with compounds that contain nutrients.

**Pathogens:** The principal source of pathogens, such as bacteria and viruses, is sanitary wastewater disposal. Discharge of untreated sanitary wastes from boats is prohibited in Maine's inland waters and in marine waters within three miles of the coast. However, illegal discharges by boaters do occur. Malfunctioning onshore septic or overboard treatment systems, pet waste, and stormwater runoff are all sources of pathogens. Whatever the source, these pollutants can cause clam flat and swimming area closures and possibly disease or infection in people who come in contact with water.

Floatables/Plastics: The primary sources of floatable and plastic materials in the water are from construction and solid wastes generated by boaters. Most waste found in waterbodies has been discarded directly into the water, although some is blown in or washed in during storms. Besides making waters and beaches unattractive, animals may become entangled in the debris or mistake bits of plastic for food.

## Reducing Toxic Pollution

Steps that have already been taken to reduce the amount of contamination entering Maine's waters include:

- stricter requirements for industrial and municipal discharge permits and pre-treatment programs;
- the reduction of combined sewer overflows; (overflows of stormwater and sanitary wastewater)
- better oil-spill prevention and response;
- the cleanup of many hazardous waste sites;
- the discontinued use of shore-side dumps;
- the elimination of leaded gasoline;
- increased awareness among citizens and boaters regarding safe disposal of toxic materials;
- collection programs for household hazardous wastes; and
- the use of best management practices in road construction, development, farming, forestry, and marinas, and boatyards.

To continue reducing levels of pollution in Maine waters, more attention must now be focused on nonpoint sources of pollution such as stormwater runoff at marinas and boatyards. The following chapters describe the things that marina and boatyard operators can do to protect the resource they depend on. Once these measures are taken, pollution levels will be reduced and the ecosystem will eventually cleanse itself: persistent pollutants will be diluted when covered and mixed with new, cleaner sediments and some will break down chemically. But the ecosystem cannot recover without a concerted effort on the part of all who enjoy and use Maine's waters to stop the small but numerous discharges of pollution.